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DISTRIBUTION OF WAVE HEIGHTS IN PHITTI CREEK DURING SOUTHWEST MONSOON

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ABSTRACT: A waverider buoy was deployed in Phitti Creek (24°33'N; 67°03'E) for wave measurements during April-July 1986. Using Tucker's method wave records were calculated in terms of significant wave height (H_S) and Maximum Wave Height (H_{max}). For each parameter weekly mean and standard deviation values were also computed for statistical analysis. For H_S the lowest mean value of 0.8m and for H_{max} the lowest mean value of 1.51m were observed in the fourth week of April whereas the highest mean value observed for H_S was 3.02m and for H_{max} was 4.94m in the fourth week of June, 1986.

KEY WORDS: Wave lengths - Phitti creek - Karachi.

INTRODUCTION

The coast in the vicinity of Karachi constitutes a system of shallow creeks amongst which the Phitti Creek is of special importance due to the location of Port Muhammad Bin Qasim at its mouth, about 50 Km away in the South East (24°-46'N; 67°-21'E) of Karachi.

In 1978-79 an approach channel for navigation was dredged through the Phitti Creek in order to develop the Port Qasim. To monitor the channel infill for dredging requirements, several surveys were undertaken by the Port Qasim Authority since 1979. The hydrography department of Port Qasim Authority has been developing a waverider buoy at Fairway site (24°-33'N; 67o-03'E) to study the wave pattern. In an earlier paper (Tirmizi *et al.*, 1993) we have discussed waved analysis during April to July 1985, using bar diagrams for percentage frequency distribution. In the present paper using the data for significant wave height and maximum wave height, we have calculated the values for mean and SD for the period April to July 1986.

MATERIALS AND METHODS

A number of methods can be used for measuring wave heights (Pond and Pickard, 1983; Bourden, 1983). Some of them are approximate and some are accurate. For a reliable and accurate method of wave measurement, usually a waverider buoy is used (Draper, 1961).

The wave rider is a surface buoy which, following the movements of water surface, measures waves by measuring the vertical accelerations of the buoy. The wave signals are automatically transmitted to waverider receiver placed at the shore based station, where the wave profile is recorded intermittently on a graphical paper roll at regular intervals of fixed time (in the present study six hrs. intervals were set).

Due to the reliability of Tucker's method (Tucker, 1963b) wave records were calculated in terms of significant wave height (H_S).

$H_S = 4.00\ H_{rms}$

$H_{rms} = Rt \times H$

Maximum wave height (H_{max})

$H_{max} = H_{rms}\ 2(20)^{1/2}(1+0.289\ 0^{-1} - 0.247\ 0^{-2})$

From the data collected during April to July 1986, weekly mean and standard deviation values are computed for statistical analysis and shown in Table 1.

RESULTS AND DISCUSSION

The mean weekly off-shore significant wave height (H_s) during 1986 SW monsoon is shown in Fig.1 with the SD of each week. Weekly highest and lowest values are also shown in the same figure.

The mean value of 0.98 m of H_s occurred during third week of April with an SD of 0.23 m. The highest and lowest H_s for the week were 1.35 m and 0.54 m. In the fourth week of April the mean H_s was 0.86 m with an SD of 0.38 m, the highest of 1.68 m and the lowest of 0.42 m. In the fifth week the mean H_s was 0.2 m with an SD of 0.18 m, highest of 1.24 m and lowest of 0.70 m.

The mean value of 1.06 m occurred during the first week of May with an SD of 0.31 m, highest of 1.69 m and lowest of 0.66 m. In the second week of May the mean H_s was 1.46 m with an SD of 0.21m, highest of 1.88 m and the lowest of 1.14 m. In the third week the mean H_s was 1.15 m with an SD of 0.31 m, highest of 1.62 m and lowest of 0.65 m. In the fourth week of May the mean was 1.62 m with an SD of 0.24 m, highest of 1.97 m and the lowest of 1.22 m.

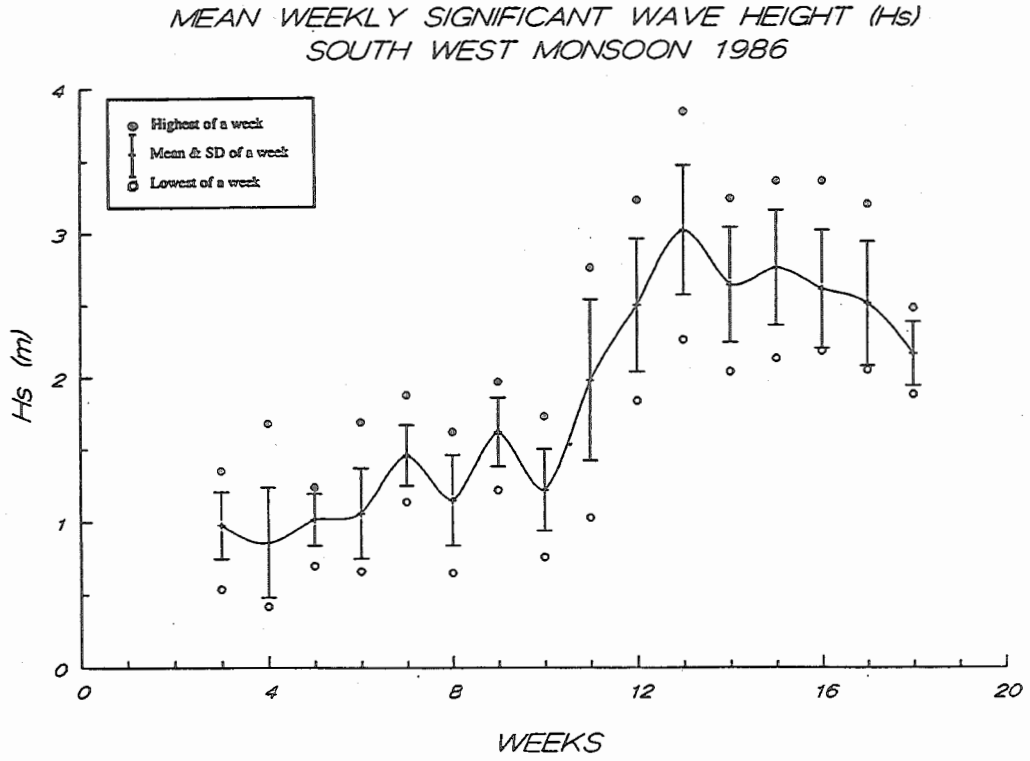
The mean H_s of 1.22 m occurred during the first week of June with an SD of 0.28 m, highest of 1.73 m and lowest of 0.76 m. In the second week the mean H_s was 1.98 m with an SD of 0.56 m, highest of 2.76 m and the lowest of 1.03 m. In the third week of June the mean H_s was 2.50 m with an SD of 0.46 m, highest of 3.23 m and lowest of 1.84 m. In the fourth week the mean H_s was 3.02 m with an SD of 0.45 m, highest of 3.84 m and lowest of 2.26 m.

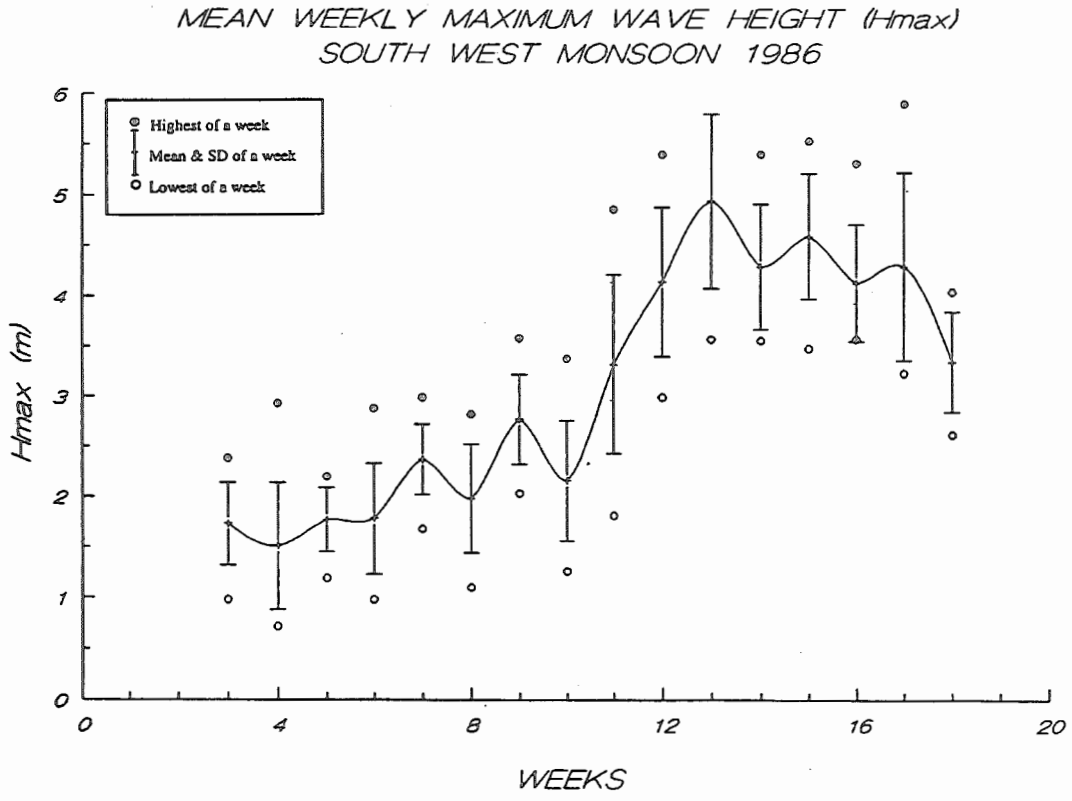
The mean H_s of 2.64 m occurred during first week of July with an SD of 0.40 m, highest of 3.24 m and lowest of 2.04 m. In the second week the mena was 2.76 m with an SD of 0.40 m, highest of 3.36 m and lowest of 2.13 m. In the third week the mean H_s was 2.61 m with an SD of 0.41 m, highest of 3.36 m and the lowest of 2.18 m. In fourth week the mean H_s was 2.51 m with an SD of 0.43 m, highest of 3.20 m and lowest of 2.05 m. In the fifth week of July the mean H_s was 2.16 m with an SD of 0.22 m, highest of 2.48 m and lowest of 1.88 m.

The highest H_s in the month of April was 1.68 m and the lowest was 0.42 m. In the month of May the highest was 1.97 m and the lowest was 0.65 m. In the month of June the highest H_s was 3.84 m and lowest was 1.03 m. In July the highest H_s of 3.36 m and the lowest of 1.88 m were observed. The highest value for H_s during the SW monsoon of 1986 occurred in the fourth week of June and the lowest of 0.42 m in the fourth week of April with a mean of 3.02 and 0.86 m respectively.

The mean weekly off-shore maximum wave height (H_{max}) during 1986 SW monsoon is shown in Fig.2, with the SDs of each week. The highest and lowest values of a week are also plotted on the same figure.

The mean H_{max} of 1.73 m with an SD of 0.41 m, highest of 2.38 m and lowest of


MEAN WEEKLY SIGNIFICANT WAVE HEIGHT (Hs)
SOUTH WEST MONSOON 1986
Highest of a week
Mean & SD of a week
Lowest of a week
Hs (m)
WEEKS
0
1
2
3
4
0
4
8
12
16
20


MEAN WEEKLY MAXIMUM WAVE HEIGHT (Hmax)
SOUTH WEST MONSOON 1986
Highest of a week
Mean & SD of a week
Lowest of a week
Hmax (m)
WEEKS
0
1
2
3
4
5
6
0
4
8
12
16
20

0.98 m occurred during third week of April. In the fourth week the mean H_{max} of 1.51 m with an SD of 0.63 m, highest of 2.93 m and lowest of 0.72 m occurred.

The mean value of H_{max} of 1.78 m occurred during first week of May with an SD of 0.55 m, highest of 2.88 m and lowest of 0.98 m. In the second week of May the mean H_{max} was 2.37 m with an SD of 0.35 m, highest of 2.99 m and lowest of 1.68 m. In the third week the mean H_{max} was 1.98 m with an SD of 0.54 m, highest of 2.82 m and lowest of 1.10 m. In the fourth week of May the mean H_{max} of 2.77 m with an SD of 0.45 m, highest of 3.58 m and lowest of 2.03 m occurred.

The mean H_{max} of 2.16 m with an SD of 0.60 m, highest of 3.38 m and lowest of 1.26 m occurred during first week of June. In the second week the mean H_{max} 3.32 m with an SD of 0.89 m, highest of 4.86m and lowest of 1.81 m occurred. In the third week mean H_{max} was 4.14 m with an SD of 0.74 m, highest of 5.40 m and the lowest of 2.99 m. In the fourth week mean H_{max} was 4.94 m with an SD of 0.86 m, highest of 6.52 m and lowest of 5.37 m.

The mean H_{max} in the first week of July was 4.29 m with an SD of 0.62 m, highest of 5.40 m and the lowest of 3.56 m. In second week the mean H_{max} was 4.59 m with an SD of 0.62 m, highest of 5.53 m and lowest of 3.48 m. In third week the mean H_{max} was 4.13 m with an SD of 0.58 m, highest of 5.31 m and lowest of 3.57 m. In fourth week the mean H_{max} was 4.29 m with an SD of 0.93, highest of 5.90 m and lowest of 3.23 m. In the fifth week of July the mean was 3.34 m with an SD of 0.50 m, highest of 4.04 m and lowest of 2.61 m.

The highest H_{max} in April 1986 was 2.9 3m and the lowest was 0.72 m. Highest of 3.58 m and lowest of 0.98 m occurred during May. In June the highest H_{max} was 6.52 m and lowest was 1.81 m. The highest H_{max} of 5.90 m and lowest of 2.61 m occurred during July. The highest H_{max} of the SW monsoon 1986 was 6.5 m, which occurred during fourth week of June and the lowest of 0.72 m occurred during fourth week of April.

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